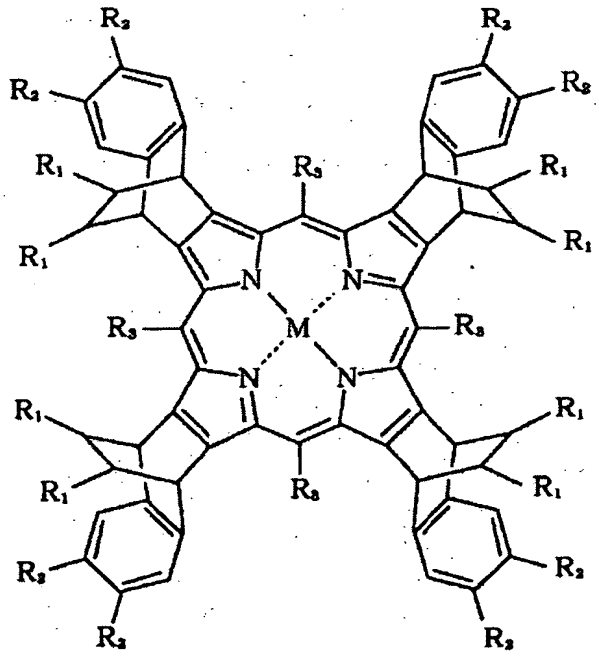
CLAIMS

1. A method of producing a field effect transistor comprising an organic semiconductor layer, comprising a step of heating a coating film comprising a porphyrin compound represented by general formula (1):

general formula (1)

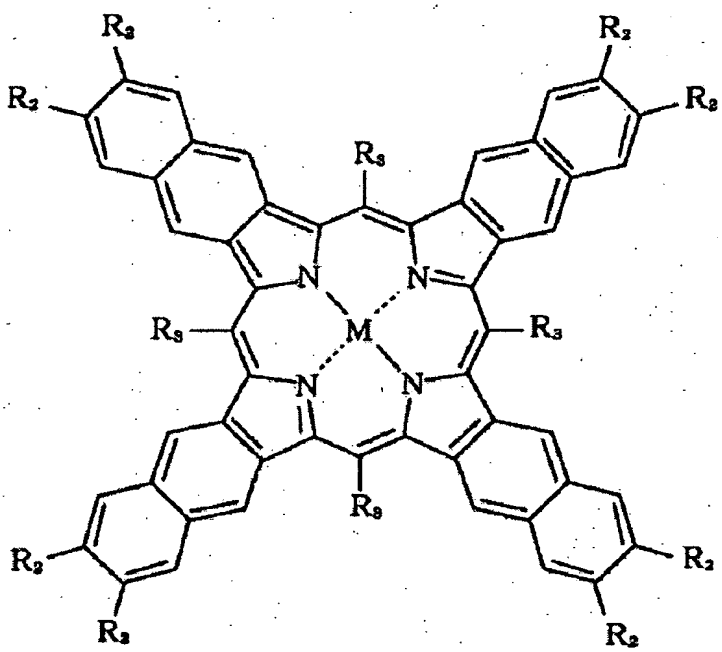


wherein R_1 and R_2 each independently denote at least one selected from the group consisting of hydrogen, halogen, hydroxyl, and alkyl, oxyalkyl, thioalkyl and alkyl ester, each alkyl having 1 to 12 carbon atoms; R_3 denotes at least one selected from the group consisting of a hydrogen atom and an aryl group; and

M denotes two hydrogen atoms, a metal atom or a metal oxide;

to form as the organic semiconductor layer a crystallized film of a porphyrin compound represented by general formula (2):

general formula (2)

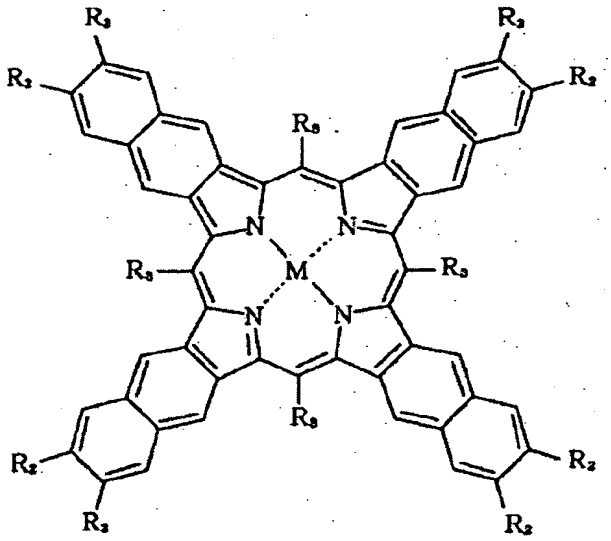


wherein R_2, R_3 and M each denote the same as defined above.

2. The method of producing a field effect transistor according to claim 1, wherein the coating film comprising the porphyrin compound represented by the general formula (1) is heated at a temperature range from 200 to 350°C to produce the compound of the general formula (2) therefrom.

3. A field effect transistor comprising an organic semiconductor layer composed of a crystallized film of a naphthoporphyrin compound represented by general formula (2):

general formula (2)



wherein R_1 and R_2 each independently denote at least one selected from the group consisting of hydrogen, halogen, hydroxyl, and alkyl, oxyalkyl, thioalkyl and alkyl ester, each alkyl having 1 to 12 carbon atoms; R_3 denotes at least one selected from the group consisting of a hydrogen atom and an aryl group; and M denotes two hydrogen atoms, a metal atom or a metal oxide,

wherein the crystallized film has crystal grains having a maximum diameter of 1 μm or more.

4. The field effect transistor according to

claim 3, wherein the organic semiconductor layer comprised of the naphthoporphyrin compound represented by the general formula (2) has a strong absorption at 650 nm or longer.

5. The field effect transistor according to claim 3 or 4, wherein in the naphthoporphyrin compound represented by the general formula (2), R_2 is a hydrogen atom.

6. The field effect transistor according to claim 3, wherein in the naphthoporphyrin compound represented by general formula (2), R_3 is a hydrogen atom.

7. The field effect transistor according to claim 3, wherein in the naphthoporphyrin compound represented by general formula (2), M represents two hydrogen atoms.

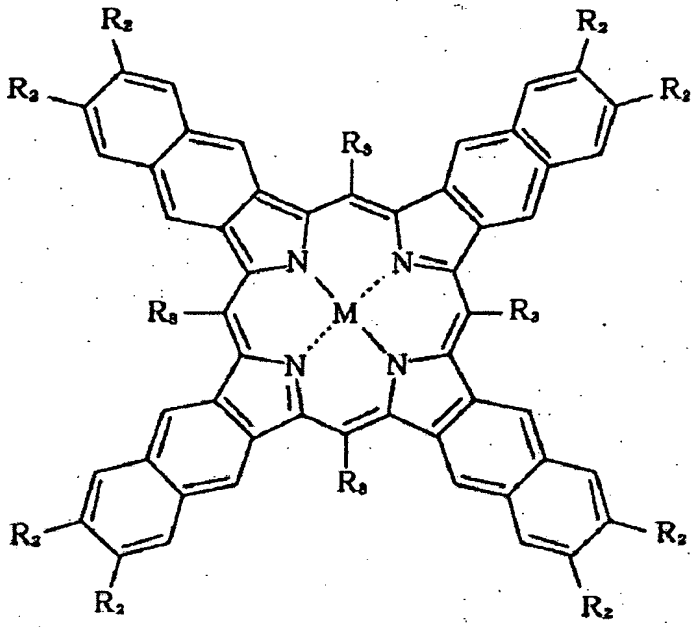
8. The field effect transistor according to claim 3, wherein in the naphthoporphyrin compound represented by general formula (2), M represents one copper atom.

9. The field effect transistor according to claim 3, wherein the organic semiconductor layer has a field effect mobility of 1×10^{-3} $cm^2/V \cdot s$ or more and an On/Off ratio of 100 or more.

10. A field effect transistor comprising an organic semiconductor layer composed of a crystallized layer of a naphthoporphyrin compound

represented by general formula (2):

general formula (2)



wherein R_1 and R_2 each independently denote at least one selected from the group consisting of hydrogen, halogen, hydroxyl and alkyl, oxyalkyl, thioalkyl and alkyl ester, each alkyl those having 1 to 12 carbon atoms; R_3 denotes at least one selected from the group consisting of a hydrogen atom and an aryl group; and M denotes two hydrogen atoms, a metal atom or a metal oxide,

wherein the crystallized film has a strong absorption at 650 nm or longer.